

I CLAIM AS MY INVENTION:

1. An antenna element for magnetic resonance applications comprising:

a sub-section extending along a section axis;

an auxiliary circuit disposed adjacent to said sub-section, said auxiliary circuit comprising a coupling section and an auxiliary circuit section;

said auxiliary circuit being inductively coupled to said sub-section by said coupling section, and said auxiliary circuit section proceeding parallel to said sub-section at a spacing from said section axis; and

said auxiliary circuit comprising controllable tuning elements each having a control state, the respective control states being selectively controllable for, dependent on the respective control states, causing a radio frequency excitation current flowing in said sub-section to produce an auxiliary current in said auxiliary current section leading said excitation current, or an auxiliary current in said auxiliary current section lagging said excitation current, or no auxiliary current in said auxiliary current section.

2. An antenna element as claimed in claim 1 wherein said coupling section is a component of said sub-section.

3. An antenna element as claimed in claim 1 wherein said coupling section is a separate element from said sub-section,

4. An antenna element as claimed in claim 1 wherein said sub-section is a first sub-section, said auxiliary circuit is a first auxiliary circuit, said coupling section is a first coupling section, said auxiliary circuit section is a first auxiliary circuit section, and said controllable tuning elements are first controllable tuning elements, and wherein said antenna element further comprises:

- a second sub-section axially offset from said first sub-section;

- a second auxiliary circuit adjacent to said second sub-section;

- said second auxiliary circuit comprising a second coupling section and a second auxiliary circuit section;

- said second auxiliary circuit being inductively coupled to said second sub-section by said second coupling section, and said second auxiliary circuit section proceeding parallel to said second sub-section at a spacing from said section axis; and

- said second auxiliary circuit comprising second controllable tuning elements having respective control states, the respective control states of said second controllable tuning elements being selectively controllable for, dependent on the respective control states of the second controllable tuning elements, causing a radio frequency excitation current flowing in the second sub-section to produce an auxiliary current in the second auxiliary

circuit section leading said excitation current in the second sub-section, or an auxiliary current in the second auxiliary current section lagging the excitation current in the second sub-section, or no auxiliary current in the second auxiliary current section.

5. An antenna element as claimed in claim 4 wherein said first and second auxiliary circuits are inductively decoupled from each other.

6. An antenna element as claimed in claim 5 wherein said first and second auxiliary circuits have an overlapping region.

7. An antenna element as claimed in claim 4 wherein said second controllable tuning elements are selectively controllable independently of said first controllable tuning elements.

8. An antenna arrangement for magnetic resonance applications comprising:

a plurality of antenna elements disposed parallel to each other; and
each of said antenna elements comprising a sub-section extending along a section axis, a auxiliary circuit disposed adjacent to said sub-section, said auxiliary circuit comprising a coupling section and an auxiliary circuit section, said auxiliary circuit being inductively coupled to said sub-section by said coupling section, and said auxiliary circuit section proceeding

parallel to said sub-section at a spacing from said section axis, and said auxiliary circuit comprising controllable tuning elements each having a control state, the respective control states being selectively controllable for, dependent on the respective control states, causing a radio frequency excitation current flowing in said sub-section to produce an auxiliary current in said auxiliary current section leading said excitation current, or an auxiliary current in said auxiliary current section lagging said excitation current, or no auxiliary current in said auxiliary current section.

9. An antenna arrangement as claimed in claim 8 wherein said coupling section is a component of said sub-section.

10. An antenna arrangement as claimed in claim 8 wherein said coupling section is a separate element from said sub-section,

11. An antenna arrangement as claimed in claim 8 wherein said sub-section is a first sub-section, said auxiliary circuit is a first auxiliary circuit, said coupling section is a first coupling section, said auxiliary circuit section is a first auxiliary circuit section, and said controllable tuning elements are first controllable tuning elements, and wherein each of said antenna elements further comprises:

a second sub-section axially offset from said first sub-section;

a second auxiliary circuit adjacent to said second sub-section;

said second auxiliary circuit comprising a second coupling section and
a second auxiliary circuit section;

said second auxiliary circuit being inductively coupled to said second
sub-section by said second coupling section, and said second
auxiliary circuit section proceeding parallel to said second sub-
section at a spacing from said section axis; and

said second auxiliary circuit comprising second controllable tuning
elements having respective control states, the respective control
states of said second controllable tuning elements being
selectively controllable for, dependent on the respective control
states of the second controllable tuning elements, causing a
radio frequency excitation current flowing in the second sub-
section to produce an auxiliary current in the second auxiliary
circuit section leading said excitation current in the second sub-
section, or an auxiliary current in the second auxiliary current
section lagging the excitation current in the second sub-section,
or no auxiliary current in the second auxiliary current section.

12. An antenna arrangement as claimed in claim 11 wherein said
first and second auxiliary circuits are inductively decoupled from each other.

13. An antenna arrangement as claimed in claim 12 wherein said
first and second auxiliary circuits have an overlapping region.

14. An antenna arrangement as claimed in claim 11 wherein said second controllable tuning elements are selectively controllable independently of said first controllable tuning elements.

15. An antenna arrangement as claimed in claim 8 wherein each of said antenna elements is rod-shaped, and wherein said antenna elements are disposed around an arrangement axis.

16. An antenna arrangement as claimed in claim 15 wherein each of said antenna elements has opposite ends, and wherein said antenna arrangement further comprises two ferrules respectively disposed at the opposite ends of the antenna elements coupling said antenna elements with each other.

17. An antenna arrangement as claimed in claim 15 wherein each of said antenna elements has opposite ends, and wherein said antenna arrangement comprises a radio-frequency shield surrounding said antenna elements, and a plurality of capacitors coupling the respective antenna elements to said radio-frequency shield at said opposite ends.